

NIMITZ TECHNOLOGIES LLC CLAIM CHARTS RE PAT. 7,848,328*Preliminary charts based on best available information*

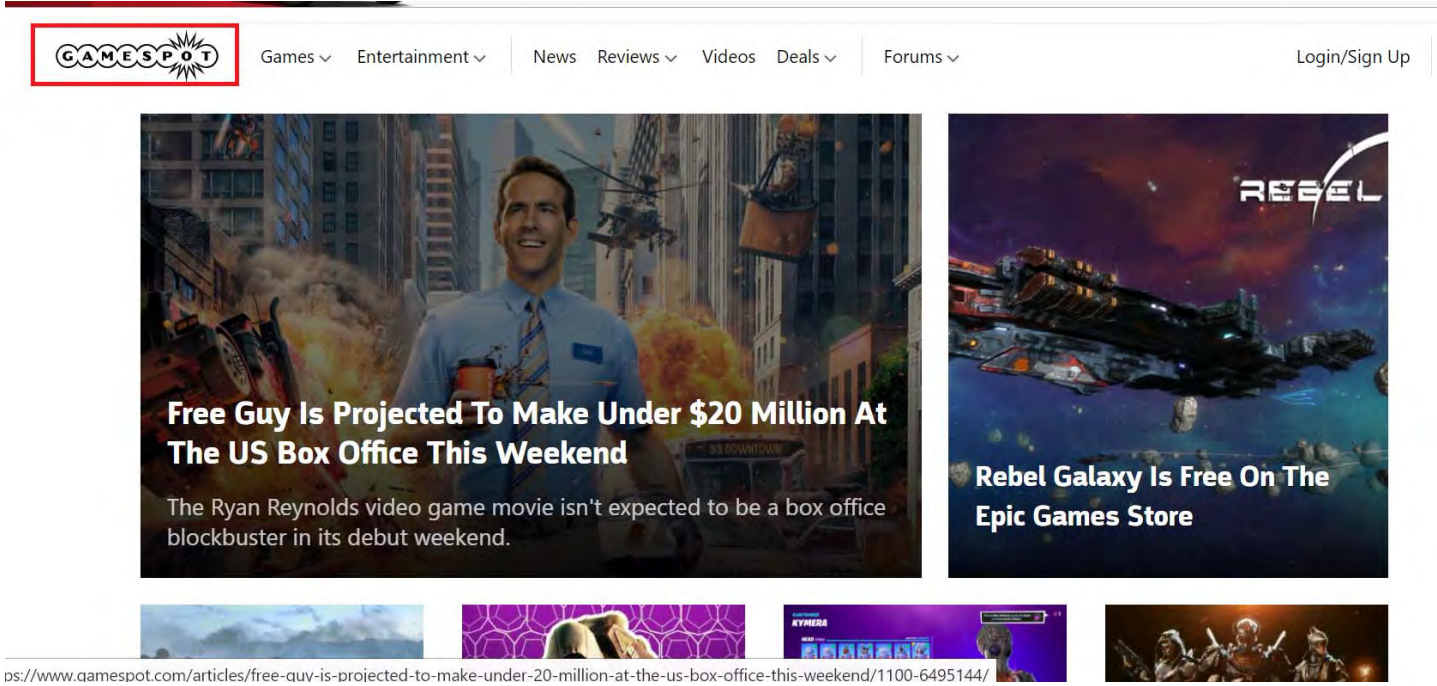
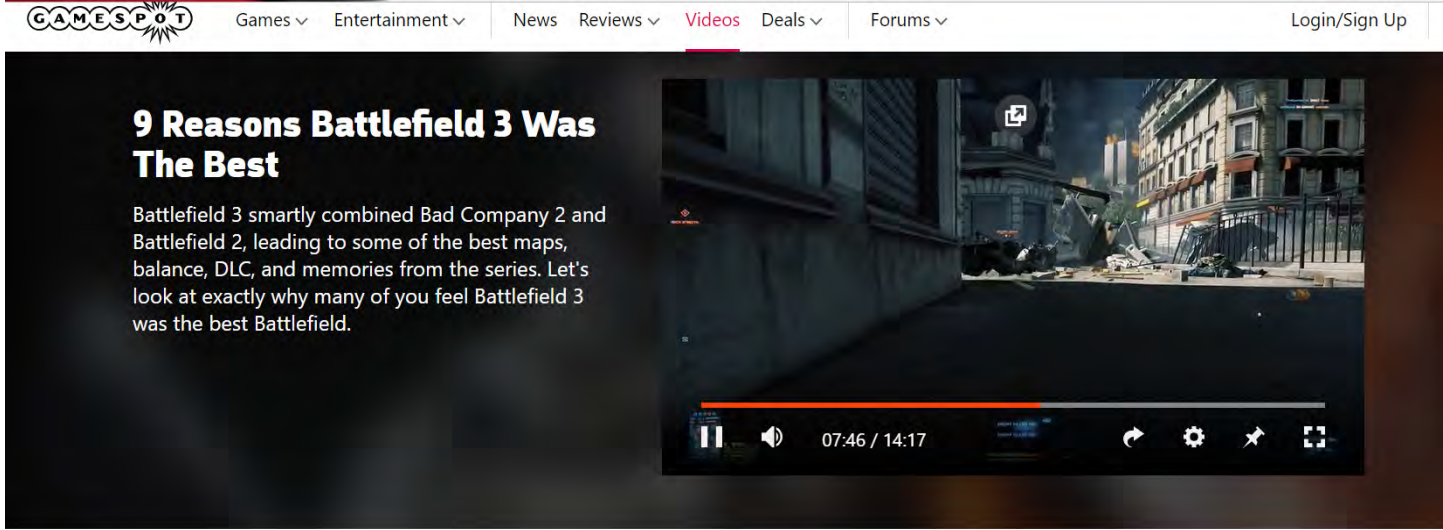
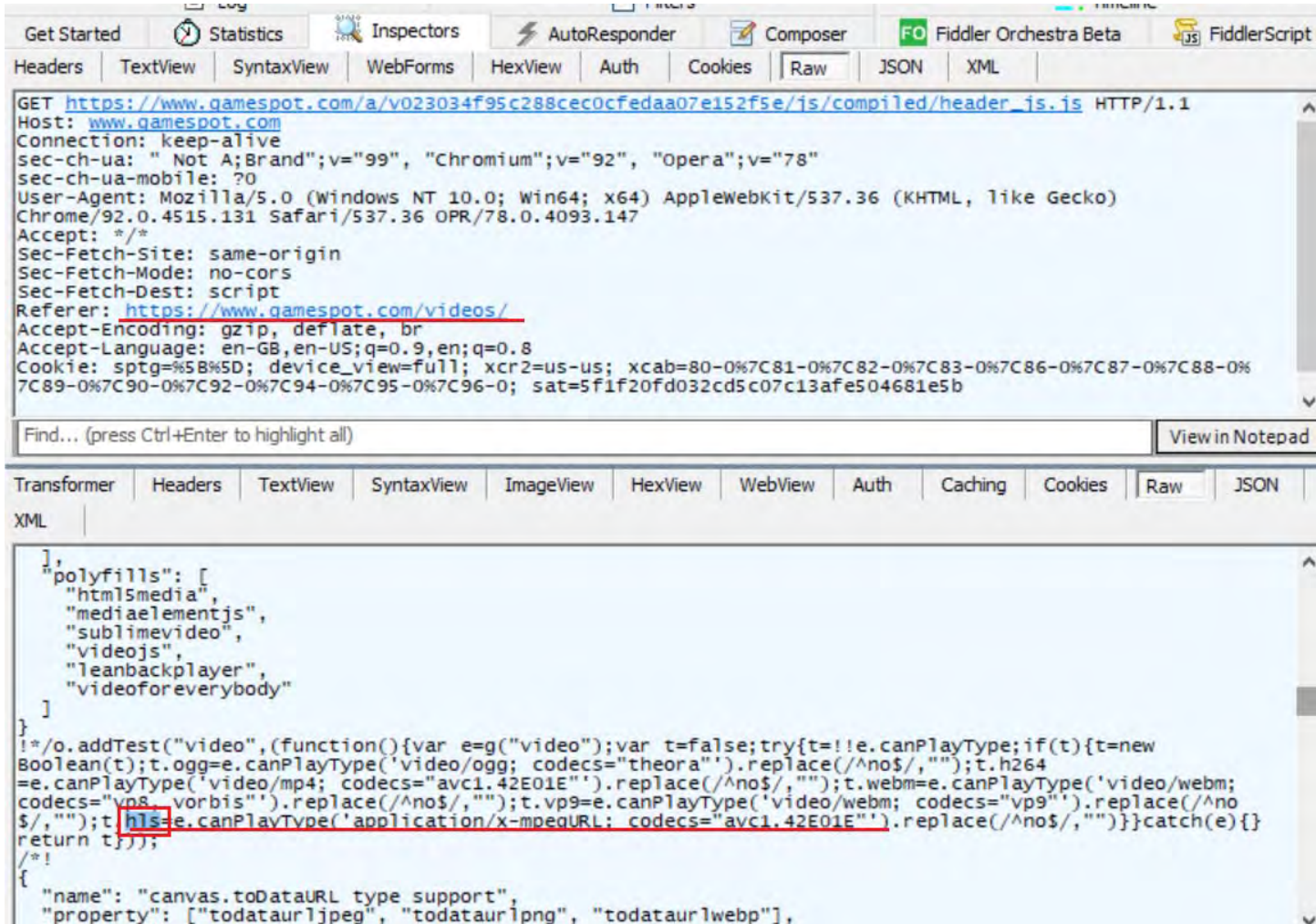
Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
<p>1. A method comprising: mapping, with at least one processor, each of a plurality of data streams related to a specific content to a different component of a service delivering multiple versions of the specific content;</p>	<p>The defendant streams videos making use of HTTP live streaming (HLS) standard (hereinafter referred to as the standard).</p>  <p>The screenshot shows the Gamespot.com website. The Gamespot logo is highlighted with a red box. The navigation bar includes links for Games, Entertainment, News, Reviews, Videos, Deals, and Forums. The main content area features a large article titled "Free Guy Is Projected To Make Under \$20 Million At The US Box Office This Weekend" with a sub-headline stating "The Ryan Reynolds video game movie isn't expected to be a box office blockbuster in its debut weekend." To the right is a promotional banner for "Rebel Galaxy" stating "Rebel Galaxy Is Free On The Epic Games Store". Below the main article are several smaller image thumbnails. At the bottom of the page, a URL is visible: https://www.gamespot.com/ps://www.gamespot.com/articles/free-guy-is-projected-to-make-under-20-million-at-the-us-box-office-this-weekend/1100-6495144/</p>

EXHIBIT 2

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Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	 <p>https://www.gamespot.com/videos/</p> <p>The accused standard discloses a method which comprises mapping, with at least one processor (e.g., processor/transcoder of a server of an HLS service provider), each of a plurality of data streams (e.g., media streams such as audio, video, captions, etc.) related to a specific content (e.g., streaming content such as web streaming, on-demand video on TV) to a different component (e.g., Index file m3u8) of a service (e.g., web streaming, on-demand TV program etc.) delivering multiple versions (e.g., M3U8 Manifest File comprises multiple versions of a data stream) of the specific content (e.g., streaming content such as web streaming, on-demand TV program etc.).</p> <p>As shown below, a server of an HLS service provider converts plurality of data streams such as audio, video, etc. of a streaming content (e.g., specific content) in multiple streams at different bitrates and resolutions in different media segments of a M3U8 Manifest File. For example a media segment may consist of representation of videos and audios. Similarly, different media segments contain many different representations.</p>

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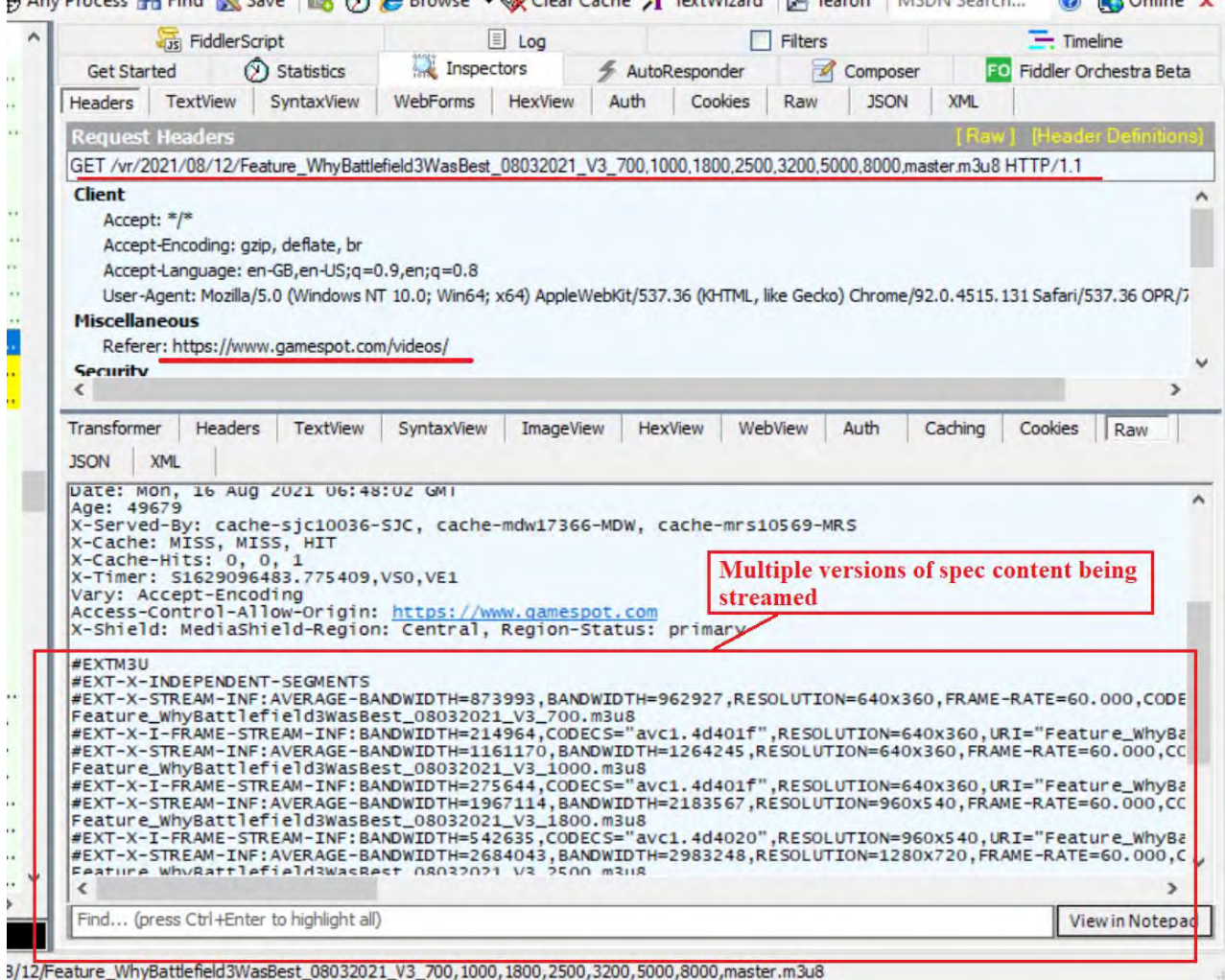
Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	 <p>The screenshot displays the Fiddler Orchestra Beta interface. The top toolbar includes buttons for 'Get Started', 'Statistics', 'Inspectors', 'AutoResponder', 'Composer', 'Fiddler Orchestra Beta', and 'FiddlerScript'. Below the toolbar, a tabbed interface shows 'Headers', 'TextView', 'SyntaxView', 'WebForms', 'HexView', 'Auth', 'Cookies', 'Raw', 'JSON', and 'XML'. The 'Raw' tab is selected, showing the raw HTTP request and response. The request is a GET to https://www.gamespot.com/a/v023034f95c288cec0cfedaa07e152f5e/is/compiled/header_js.js with various headers including 'Host', 'Connection', 'sec-ch-ua', 'User-Agent', 'Accept', 'Sec-Fetch-Site', 'Sec-Fetch-Mode', 'Sec-Fetch-Dest', 'Referer', 'Accept-Encoding', 'Accept-Language', and 'Cookie'. The response is a JSON object with a 'polyfills' array containing 'html5media', 'mediaelementjs', 'sublimevideo', 'videojs', 'leanbackplayer', and 'videoforeverybody'. Below the JSON, there is a large block of JavaScript code, with a red box highlighting the line: <code>hls=e.canPlayType('application/x-mpegURL; codecs="avc1.42E01E"').replace(/<no\$/, "");}</code>.</p>

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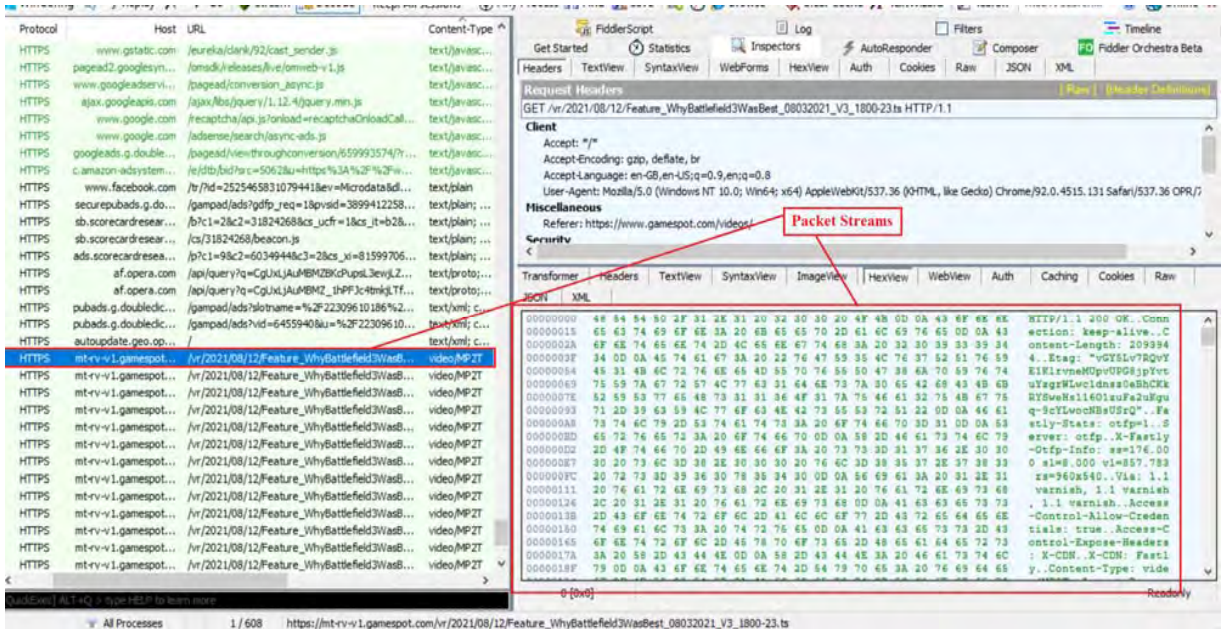
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Pat. 7,848,328	Gamespot.com (“Accused Instrumentality”)
	<p><i>Source: Packet capture by Fiddler tool</i></p> <p>As shown below, a server of an HLS streaming service provider converts plurality of data streams such as audio, video, etc. of a streaming content (e.g., specific content) such as a TV program in multiple versions in different adaptation sets of a M3U8 Manifest File. For example an adaption set may consists of representation of resolution 640 x 360 video, 960 x540 video, etc.</p>

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	 <p>The screenshot shows a FiddlerScript interface with a GET request to <code>GET /vr/2021/08/12/Feature_WhyBattlefield3WasBest_08032021_V3_700,1000,1800,2500,3200,5000,8000.master.m3u8 HTTP/1.1</code>. The request headers include <code>Accept: */*</code>, <code>Accept-Encoding: gzip, deflate, br</code>, <code>Accept-Language: en-GB,en-US;q=0.9,en;q=0.8</code>, <code>User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/92.0.4515.131 Safari/537.36 OPR/7</code>, and <code>Referer: https://www.gamespot.com/videos/</code>. The response headers include <code>Date: Mon, 16 Aug 2021 06:48:02 GMT</code>, <code>Age: 49679</code>, <code>X-Served-By: cache-sjc10036-SJC, cache-mdw17366-MDW, cache-mrs10569-MRS</code>, <code>X-Cache: MISS, MISS, HIT</code>, <code>X-Cache-Hits: 0, 0, 1</code>, <code>X-Timer: S1629096483.775409,VSO,VE1</code>, <code>Vary: Accept-Encoding</code>, <code>Access-Control-Allow-Origin: https://www.gamespot.com</code>, and <code>X-Shield: MediaShield-Region: Central, Region-Status: primary</code>. The response body contains multiple <code>EXT-X-STREAM-INF</code> segments, each with different bandwidth and resolution values, indicating multiple versions of spec content being streamed. A red box highlights the text "Multiple versions of spec content being streamed" and another red box highlights the response body content.</p>

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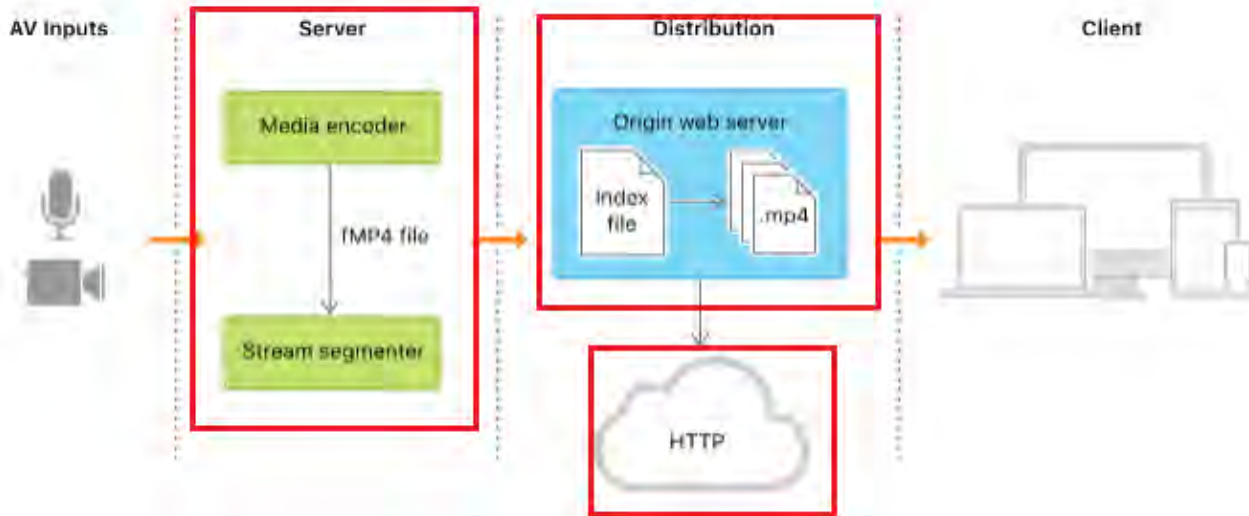
Pat. 7,848,328	Gamespot.com (“Accused Instrumentality”)
	<p><i>Source: Packet capture by Fiddler tool</i></p>  <p><i>Source: Packet capture by Fiddler tool</i></p>

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	<div data-bbox="466 365 1507 945"><p>HLS STREAMING WORKFLOW</p><pre>graph LR; subgraph Server_Side [Server Side]; MS[Media Source] --> ME[Media Encoding]; ME --> SV[Segmentation & Validation]; SV --> IF[Index File .m3u8]; IF --> D[Distribution]; D --> ABC1[ABC_1.ts]; D --> ABC2[ABC_1.ts]; D --> ABC3[ABC_1.ts]; D --> ABC4[ABC_1.ts]; D --> ABC5[ABC_1.ts]; end; subgraph Client_Playback [Client Playback]; CS[Client Services]; end; CS -- "Download Manifests" --> OH((Over Http)); OH -- "Request for Segments" --> CS;</pre><p>The diagram illustrates the HLS Streaming Workflow. On the Server Side, the process starts with a Media Source, followed by Media Encoding, and then Segmentation & Validation. These steps are noted as being performed by a Media File Segmenter OR ffmpeg or mp4 to hls. The output is an Index File (.m3u8), which is then distributed as multiple ABC_1.ts segments. On the Client Playback side, Client Services interact with the server Over Http. The client requests segments and downloads manifests.</p></div> <p>https://martech.zone/http-live-streaming-player-features/</p>

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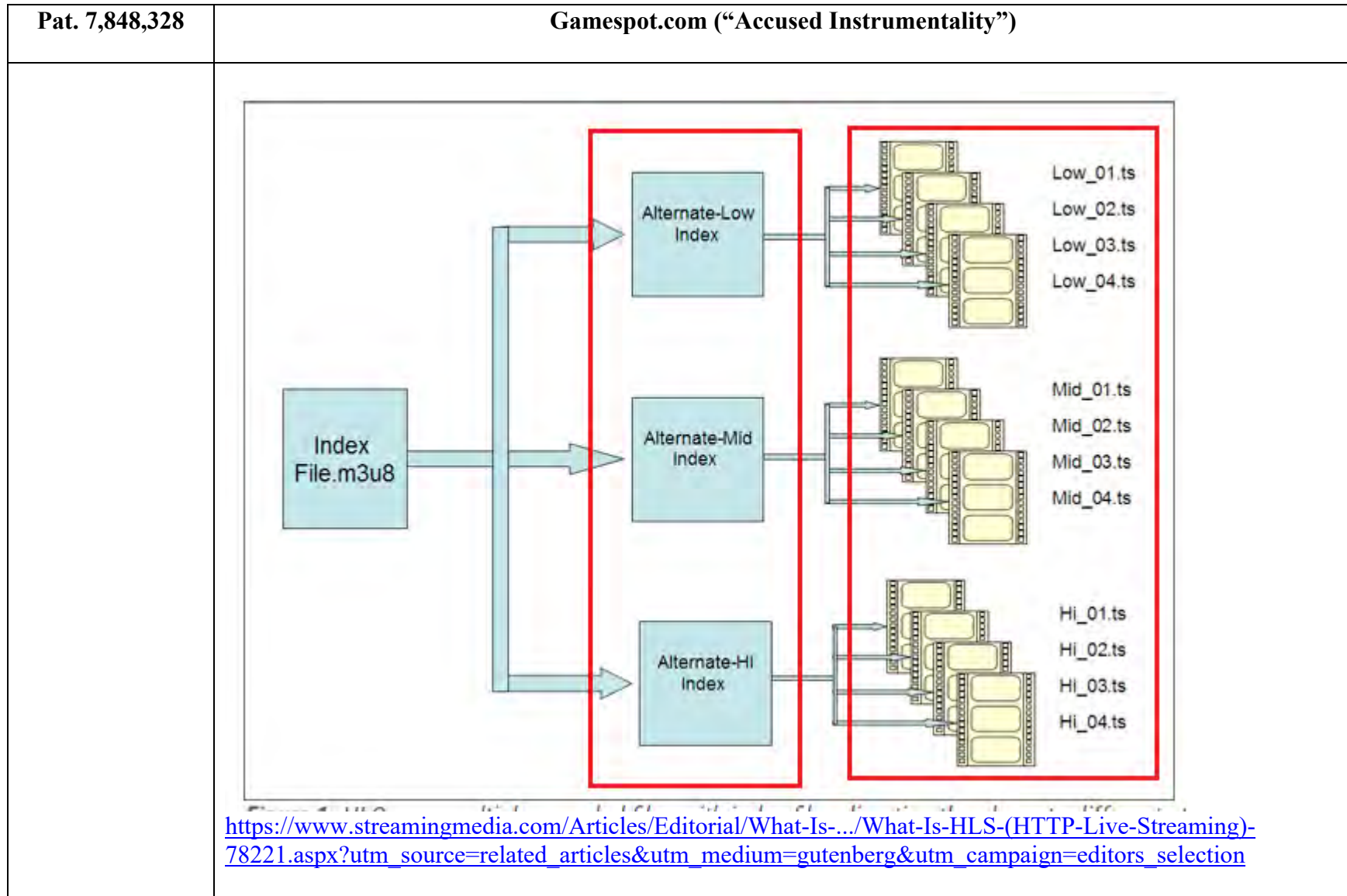
Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	<p>HLS supports the following:</p> <ul style="list-style-type: none"> • Live broadcasts and prerecorded content (<u>video on demand, or VOD</u>) • <u>Multiple alternate streams at different bit rates</u> • Intelligent switching of streams in response to network bandwidth changes • <u>Media encryption and user authentication</u> <p>The following figure shows the components of an HTTP Live Stream.</p>  <p>The diagram illustrates the components of an HTTP Live Stream. It is divided into four main sections: AV Inputs, Server, Distribution, and Client. AV Inputs (represented by a microphone and camera icon) feed into the Server. The Server contains a Media encoder and a Stream segmenter, connected by an 'HMP4 file' label. The Server outputs to the Distribution section, which contains an Origin web server. The Origin web server outputs to an HTTP cloud icon. The HTTP cloud icon outputs to the Client (represented by a laptop and tablet icon). The Distribution section also contains an Index file and .mp4 files, which are connected to the Origin web server.</p> <p>https://developer.apple.com/documentation/http_live_streaming</p>

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	<p data-bbox="478 365 1879 592">AAC audio processing requires a small amount of leading "throw-away" audio to prime the encoder and initialize internal tables. This small amount of audio results from <i>encoder delay</i> which happens during encoding to produce properly formed, encoded audio packets, and its duration is commonly referred to as the <i>priming duration</i>. This audio needs to occur before the first frame of video; otherwise, there will be no audio for the first few frames of video.</p> <div data-bbox="590 643 1772 1200"> </div> <p data-bbox="478 1242 1858 1323">The audio sample rates are normally 44.1 kHz or 48 kHz. For more information, see the HTTP Live Streaming Specification and the HLS Authoring Specification for Apple Devices.</p> <p data-bbox="451 1388 1816 1421">https://developer.apple.com/documentation/http_live_streaming/preparing_audio_for_http_live_streaming</p>

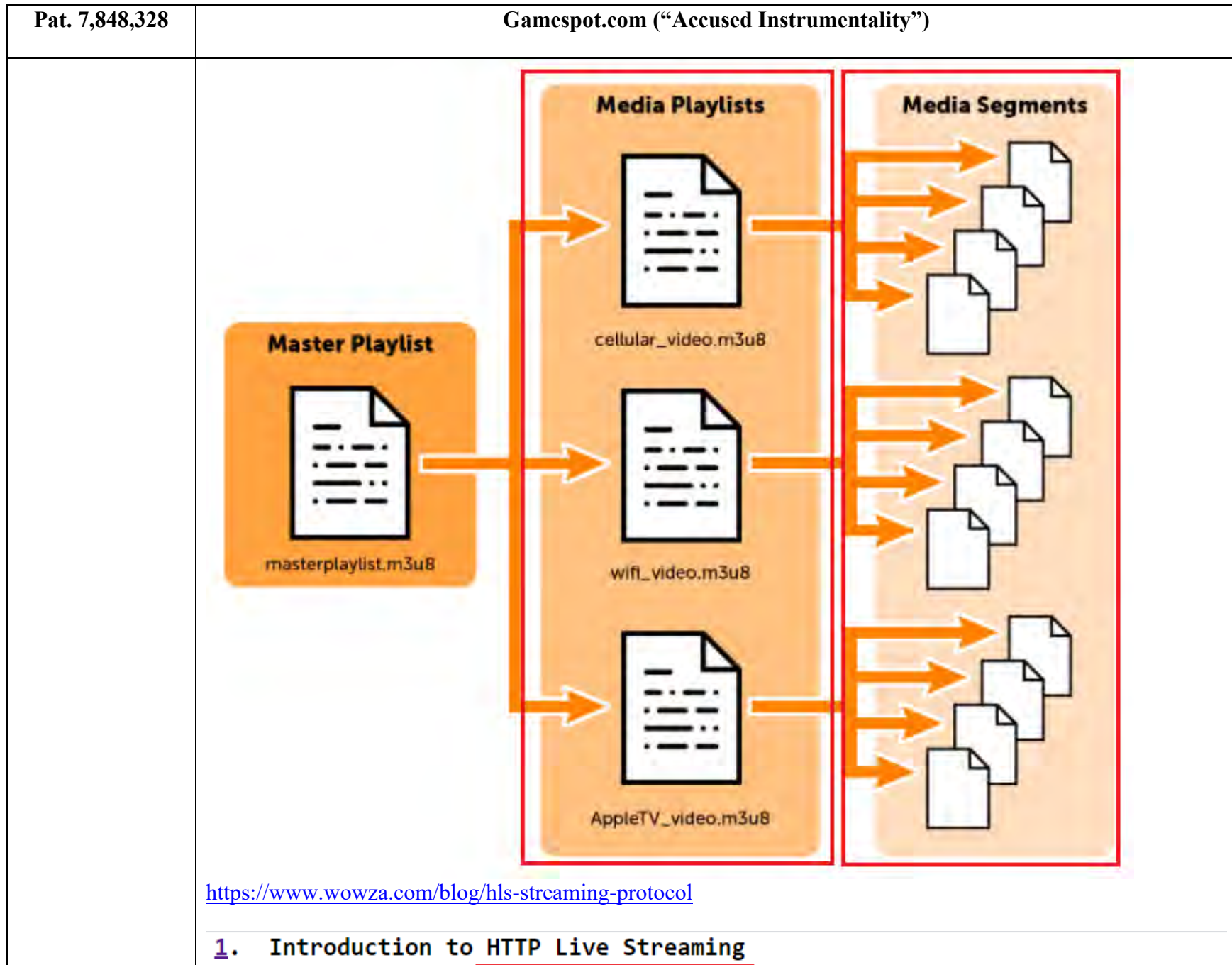
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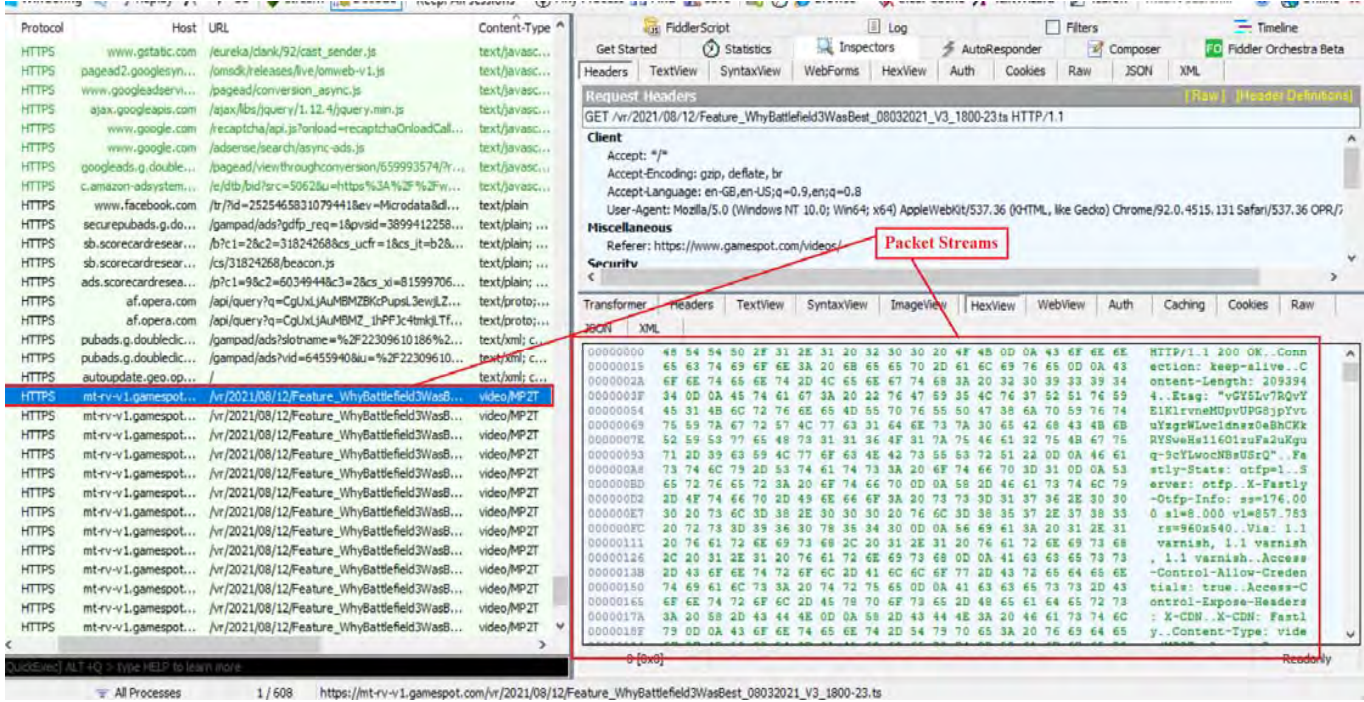


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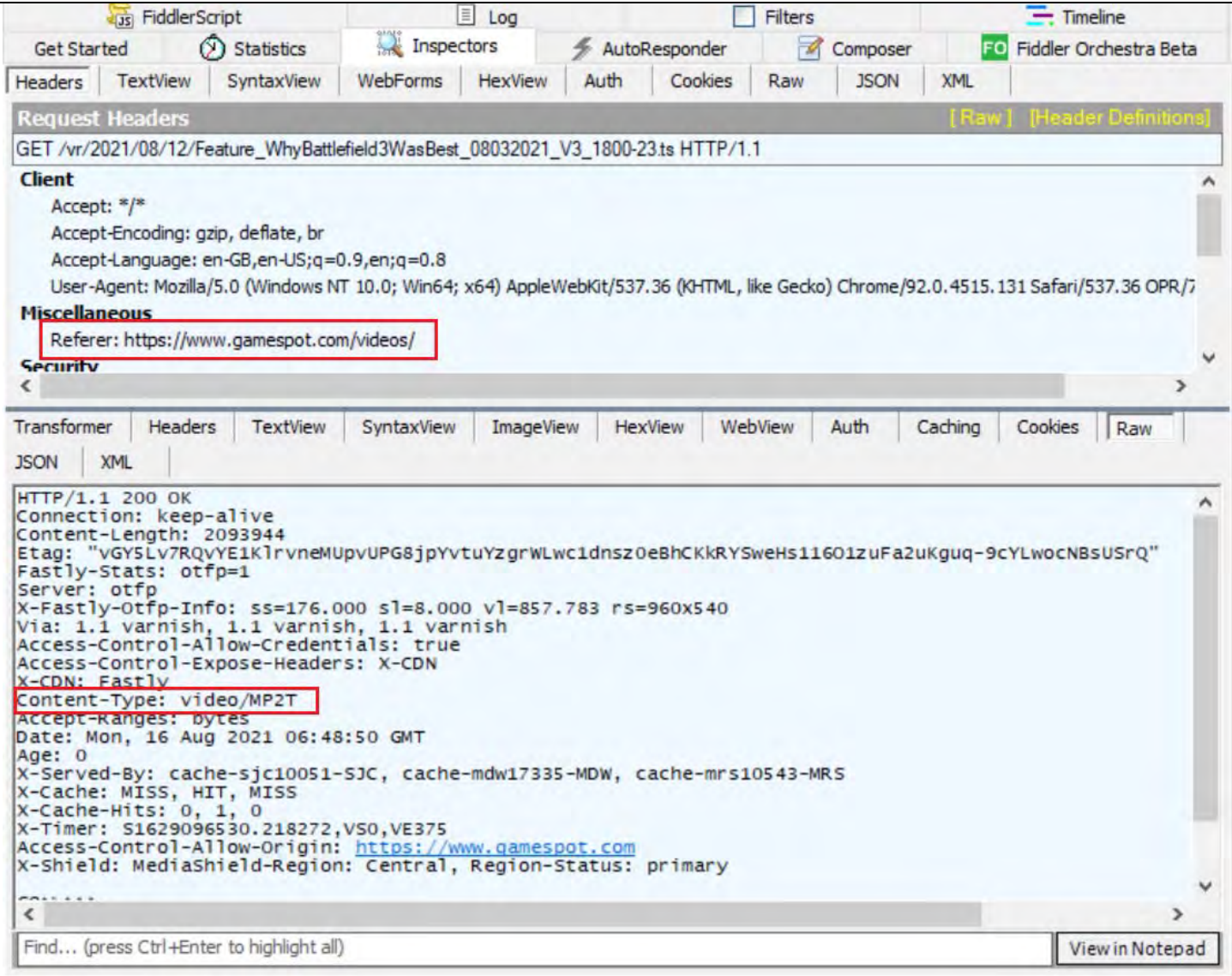
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<p>encapsulating each data stream of the plurality into a stream of packets according to a first communication protocol,</p>	<p>The accused standard discloses encapsulating each data stream (e.g., media streams such as audio, video, captions, etc.) of the plurality into a stream of packets (e.g., index file m3u8 data packets) according to a first communication protocol (e.g., Transmission control protocol).</p> <p>As shown below, For HLS, MPEG-2 transport stream is used to encapsulate the data stream (e.g., media streams such as audio, video, captions, etc.) using first communication protocol (e.g. TCP).</p>  <p>Source: Packet capture by Fiddler tool</p>

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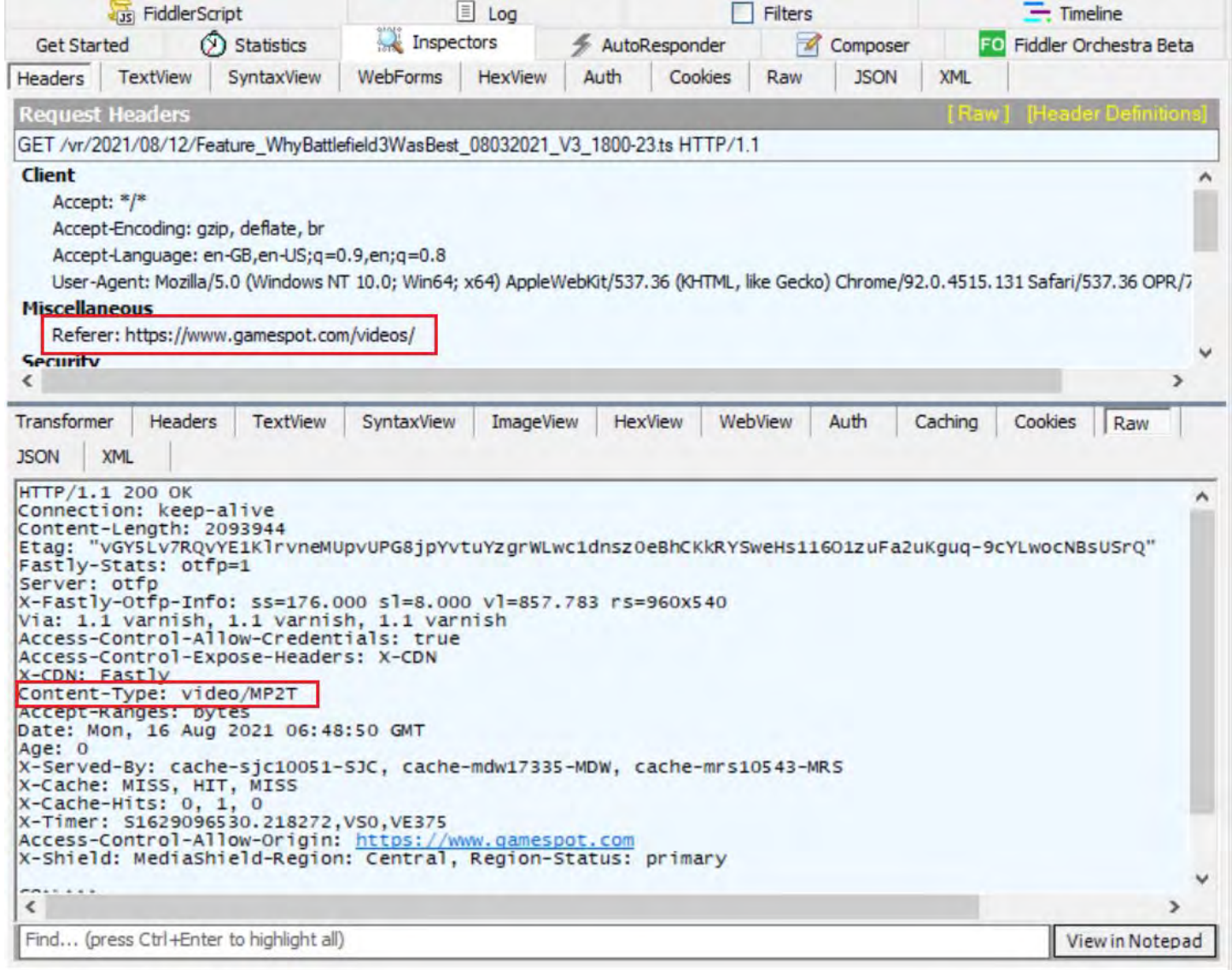
Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	 <p>The screenshot displays the Fiddler tool interface. The top menu bar includes options like 'Get Started', 'Statistics', 'Inspectors', 'AutoResponder', 'Composer', and 'Fiddler Orchestra Beta'. The 'Request Headers' tab is active, showing a GET request for the URL: <code>GET /vr/2021/08/12/Feature_WhyBattlefield3WasBest_08032021_V3_1800-23.ts HTTP/1.1</code>. The 'Client' section lists various headers including 'Accept: */*', 'Accept-Encoding: gzip, deflate, br', 'Accept-Language: en-GB,en-US;q=0.9,en;q=0.8', and 'User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/92.0.4515.131 Safari/537.36 OPR/7'. The 'Miscellaneous' section highlights the 'Referer' as <code>https://www.gamespot.com/videos/</code>. The 'Response Headers' tab is also visible, showing a 200 OK response with 'Content-Type: video/MP2T' highlighted. The bottom of the window features a search bar and a 'View in Notepad' button.</p>

Source: Packet capture by Fiddler tool

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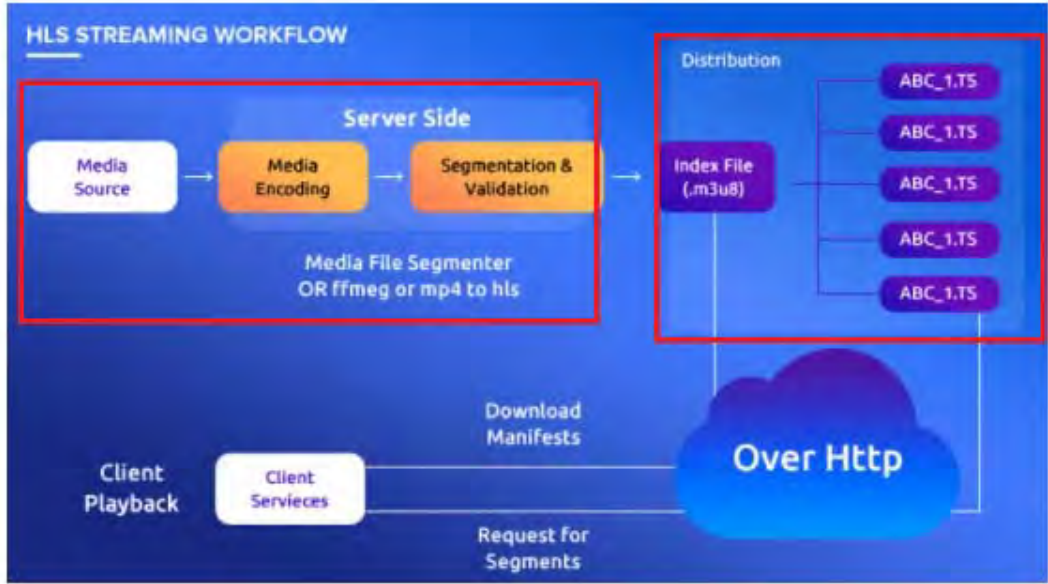
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<p>wherein, as to each of the packet streams, the packets have a value in a common field identifying the component mapped to the data stream encapsulated by the packet stream;</p>	<p>The accused standard discloses wherein, as to each of the packet streams (e.g., m3u8 data packet stream), the packets have a value (e.g., audio/video type, group id, etc.) in a common field identifying the component mapped to the data stream (e.g., media streams such as audio, video, captions, etc.) encapsulated by the packet stream (e.g., m3u8 data packet stream).</p> <p>As shown below, the common field shows “type: video”</p>

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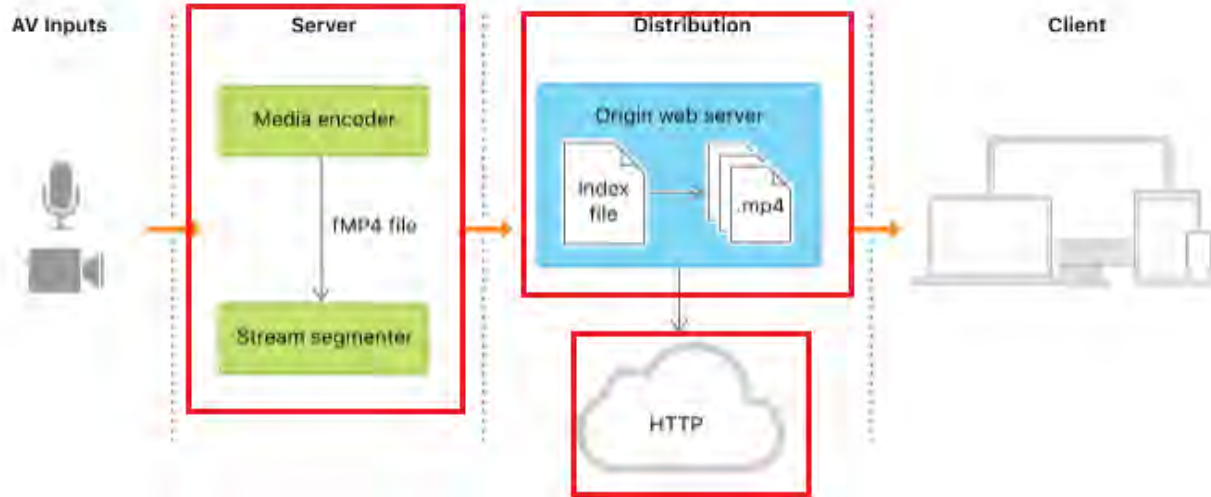
Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	 <p>The screenshot displays the Fiddler tool interface. The top menu bar includes options like 'Get Started', 'Statistics', 'Inspectors', 'AutoResponder', 'Composer', and 'Fiddler Orchestra Beta'. The 'Request Headers' tab is active, showing a GET request for the URL: <code>GET /vr/2021/08/12/Feature_WhyBattlefield3WasBest_08032021_V3_1800-23.ts HTTP/1.1</code>. The 'Client' section lists various headers including 'Accept: */*', 'Accept-Encoding: gzip, deflate, br', 'Accept-Language: en-GB,en-US;q=0.9,en;q=0.8', and 'User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/92.0.4515.131 Safari/537.36 OPR/7'. The 'Miscellaneous' section highlights the 'Referer' as <code>https://www.gamespot.com/videos/</code>. The 'Response Headers' tab is also visible, showing a 200 OK response with 'Content-Type: video/MP2T' highlighted. The bottom of the interface includes a search bar and a 'View in Notepad' button.</p>

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<p>and forwarding the packet streams for transmission in a transmission channel,</p>	<p>The accused standard discloses forwarding the packet streams (e.g., m3u8 data packet stream) for transmission in a transmission channel (e.g., wired/wireless transmission).</p>  <p>The diagram, titled "HLS STREAMING WORKFLOW", illustrates the process from media source to client playback. On the "Server Side", a "Media Source" feeds into "Media Encoding", which then feeds into "Segmentation & Validation". Below these steps is the note "Media File Segmenter OR ffmpeg or mp4 to hls". The output of "Segmentation & Validation" is an "Index File (.m3u8)". This index file is then distributed to multiple "ABC_1.TS" segments. The "Distribution" section shows the "Index File (.m3u8)" pointing to a list of five "ABC_1.TS" files. The "Client Playback" section shows "Client Services" sending a "Request for Segments" to the "Over Http" cloud, which then provides "Download Manifests" back to the "Client Services".</p> <p>https://martech.zone/http-live-streaming-player-features/</p>

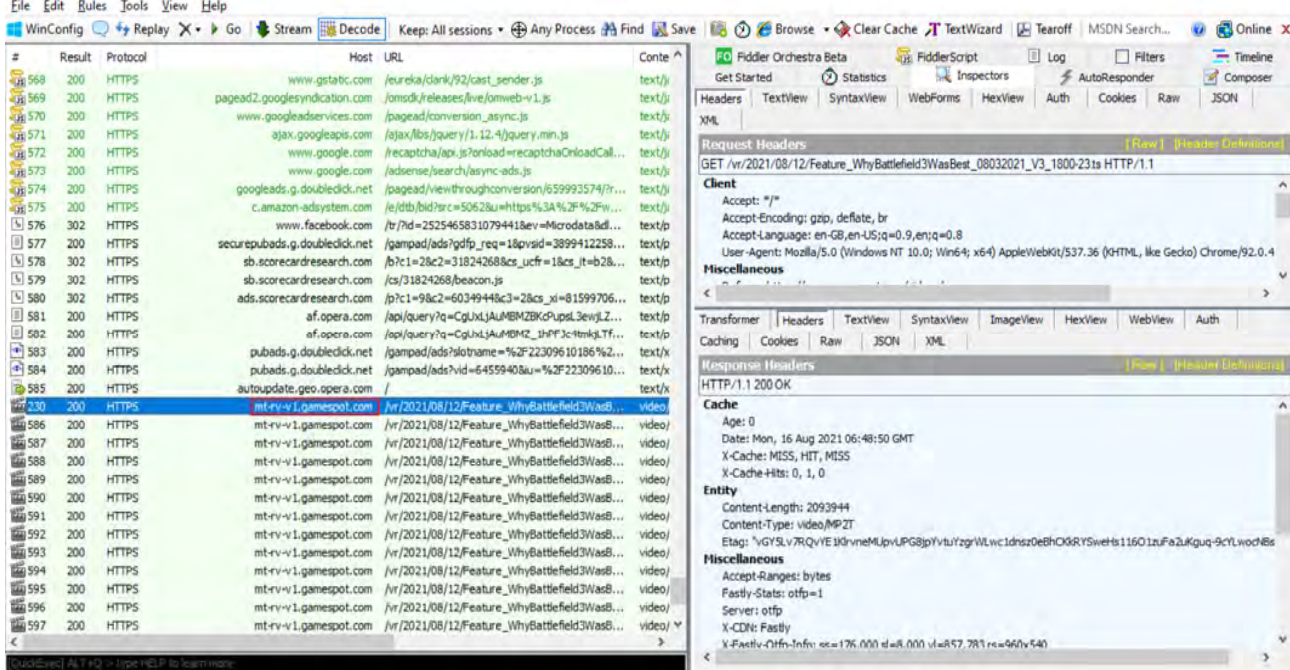
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	<p>HLS supports the following:</p> <ul style="list-style-type: none"> • Live broadcasts and prerecorded content (<u>video on demand, or VOD</u>) • <u>Multiple alternate streams at different bit rates</u> • Intelligent switching of streams in response to network bandwidth changes • <u>Media encryption and user authentication</u> <p>The following figure shows the components of an HTTP Live Stream.</p>  <p>The diagram illustrates the components of an HTTP Live Stream. It is divided into four main sections: AV Inputs, Server, Distribution, and Client. AV Inputs (represented by a microphone and camera icon) feed into the Server. The Server contains a Media encoder and a Stream segmenter, connected by an 'HMP4 file' label. The Server outputs to the Distribution section, which contains an Origin web server. The Origin web server outputs to an HTTP cloud icon, which then outputs to the Client (represented by a laptop and tablet icon). The Distribution section also includes an 'Index file' and a '.mp4' file icon.</p> <p>https://developer.apple.com/documentation/http_live_streaming</p>
and wherein the	The accused standard discloses wherein the mapping further comprises assigning a specific value (e.g., value

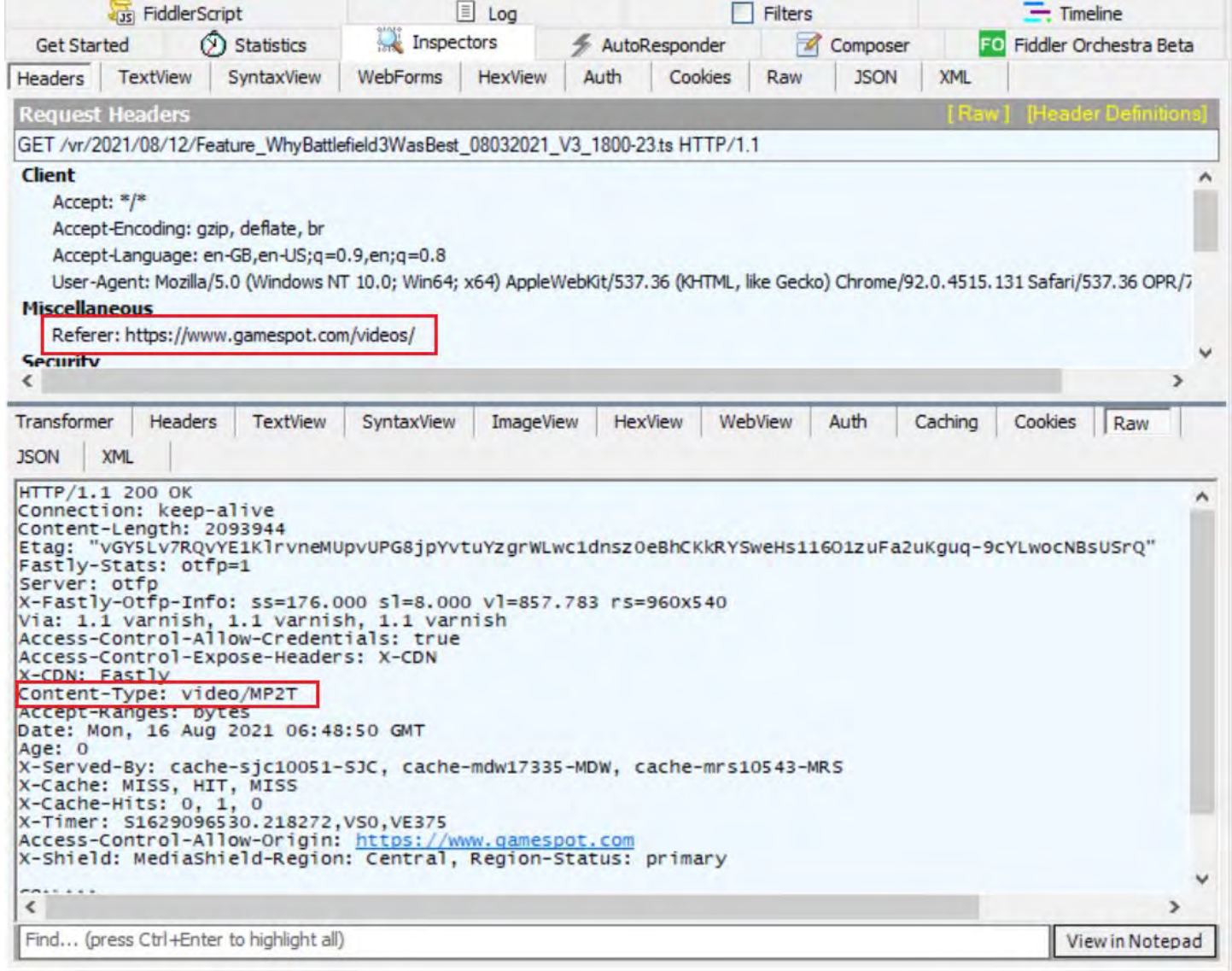
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mapping further comprises assigning a specific value to each component for a predefined field of a packet according to a second communication protocol, the specific value distinguishing the component from other components, and	<p>corresponding to different media stream) to each component for a predefined field of a packet (e.g., segment info) according to a second communication protocol (e.g., HTTP/Hypertext transfer protocol), the specific value (e.g., value corresponding to different media stream) distinguishing the component from other components.</p> <p>As shown below, the accused standard provides m3u8 index file with multiple media playlists. Each media playlist has many representations, wherein every representation has many segments, these segments contains media information of each conversion corresponding to that media playlist.</p> <p>The accused standard provides each segment having information related to a particular HTTP based uniform resource locator for getting a media stream from that particular address.</p> <p>For the video segment shown below, the base URL is mt-rv-v1.gamespot.com and the specific value is “vr/2021/08/12/Feature_WhyBattlefield3WasBest_08032021_V3_1800-23.ts” (http based).</p>

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	 <p>Source: Packet capture by Fiddler tool</p>

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Pat. 7,848,328	Gamespot.com ("Accused Instrumentality")
	 <p>The screenshot displays the Fiddler tool interface. The top menu bar includes options like 'Get Started', 'Statistics', 'Inspectors', 'AutoResponder', 'Composer', and 'Fiddler Orchestra Beta'. The 'Request Headers' tab is active, showing the following details:</p> <ul style="list-style-type: none"> Request Headers: GET /vr/2021/08/12/Feature_WhyBattlefield3WasBest_08032021_V3_1800-23.ts HTTP/1.1 Client: <ul style="list-style-type: none"> Accept: */* Accept-Encoding: gzip, deflate, br Accept-Language: en-GB,en-US;q=0.9,en;q=0.8 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/92.0.4515.131 Safari/537.36 OPR/7 Miscellaneous: <ul style="list-style-type: none"> Referer: https://www.gamespot.com/videos/ <p>The 'Response Headers' tab is also visible, showing the following details:</p> <ul style="list-style-type: none"> Response Headers: <ul style="list-style-type: none"> HTTP/1.1 200 OK Connection: keep-alive Content-Length: 2093944 Etag: "vGY5Lv7RQvYE1kTrvneMupvUPG8jpYvtuYzgrWLwcIdnsz0eBhCKkRYSweHs11601zuFa2uKguq-9cYLwocNBsUSrQ" Fastly-Stats: otfp=1 Server: otfp X-Fastly-Otfp-Info: ss=176.000 sl=8.000 vl=857.783 rs=960x540 Via: 1.1 varnish, 1.1 varnish, 1.1 varnish Access-Control-Allow-Credentials: true Access-Control-Expose-Headers: X-CDN X-CDN: Fastly Content-Type: video/MP2T Accept-Ranges: bytes Date: Mon, 16 Aug 2021 06:48:50 GMT Age: 0 X-Served-By: cache-sjc10051-SJC, cache-mdw17335-MDW, cache-mrs10543-MRS X-Cache: MISS, HIT, MISS X-Cache-Hits: 0, 1, 0 X-Timer: S1629096530.218272,V50,VE375 Access-Control-Allow-Origin: https://www.gamespot.com X-Shield: MediaShield-Region: Central, Region-Status: primary <p>At the bottom of the screenshot, there is a search bar with the text 'Find... (press Ctrl+Enter to highlight all)' and a button labeled 'View in Notepad'.</p>

Source: Packet capture by Fiddler tool

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<p>the encapsulating comprises encapsulating the packet streams according to one or more lower layer protocols without encapsulating the packet streams according to the second communication protocol.</p>	<p>The accused standard discloses encapsulating comprises encapsulating the packet streams (e.g., data packets in m3u8 file) according to one or more lower layer protocols without encapsulating the packet streams (e.g., data packets in m3u8) according to the second communication protocol (e.g. HTTP Protocol).</p> <p>Further as explained below, the packet streams are encapsulated according to one or more lower layer protocols (e.g., network layer/MAC layer/physical layer) of the device transmitting the packet streams. Since, the packet streams are obtained by TCP encapsulation of data streams and the HTTP protocol doesn’t reside beneath the TCP layer, the further encapsulation doesn’t comprise encapsulation using HTTP protocol (once TCP encapsulation has been executed).</p> <p>In any communication system, when a sender prepares data for sending from its physical interface (e.g., wired/wireless interface of the server/machine), the process of entire “data formulation” or “data construction” has multiple steps, all steps (if they are present) are associated with one layer of OSI model (it’s a model which every communication system follows, some specification communication schemes may have lower number of layers (because multiple layers of OSI can be combined into one for those cases). Two lower level layers—data link layer and physical layers are invariably present in any communication system. They are the lowest two layers. They reside beneath the TCP layer. Data link layer ensure error free communication whereas the physical layer processes the data so that it can be sent using the actual medium of communication (e.g., modulation and formatting in wireless/wired communication system)</p>

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	<div data-bbox="470 363 1787 553" style="border: 2px solid red; padding: 10px;"> <h2 style="margin: 0;">Does HLS use TCP or UDP as its transport protocol?</h2> </div> <p data-bbox="485 574 1751 711">TCP and UDP are transport protocols, meaning they are responsible for delivering content over the Internet. TCP tends to deliver data more reliably than UDP, but the latter is much faster, even though some data may be lost in transit.</p> <p data-bbox="485 751 1734 841">Because UDP is faster, some streaming protocols use UDP instead of TCP. <u>HLS, however, uses TCP.</u> This is for several reasons:</p> <ol data-bbox="485 881 1766 1157" style="list-style-type: none"> 1. HLS is over HTTP, and the HTTP protocol is built for use with TCP (with some exceptions). 2. The modern Internet is more reliable and more efficient than it was when streaming was first developed. In many parts of the world today, user connectivity has vastly improved, especially for mobile connections. As a result, users have enough bandwidth to support the delivery of every video frame. <div data-bbox="470 1195 1780 1304" style="border: 2px solid red; padding: 10px;"> <ol style="list-style-type: none"> 3. Adaptive bitrate streaming helps compensate for the potentially slower data delivery of TCP. </div> <p data-bbox="453 1333 1371 1369">https://www.cloudflare.com/learning/video/what-is-http-live-streaming/</p>

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	<p data-bbox="464 394 1115 435">HyperText Transfer Protocol (<i>HTTP</i>)</p> <p data-bbox="464 448 1617 630"><u>The HyperText Transfer Protocol, or <i>HTTP</i>, must be the most widely used Application layer protocol in the world today.</u> It forms the basis of what most people understand the Internet to be—the World Wide Web. Its purpose is to provide a lightweight protocol for the retrieval of HyperText Markup Language (<i>HTML</i>) and other documents from Web sites throughout the Internet. Each time you open a Web browser to surf the Internet, you are using <i>HTTP</i> over <i>TCP/IP</i>.</p> <p data-bbox="464 662 1425 695"><i>HTTP</i> was first ratified in the early 1990s and has been through three main iterations:</p> <ul data-bbox="562 727 1612 1149" style="list-style-type: none"> • HTTP/0.9: A simplistic first implementation of the protocol that only supported the option to get a Web page. • HTTP/1.0: Ratified by the <i>IETF</i> as RFC 1945 in 1996. This version added many supplemental data fields, known as <i>headers</i> to the specification. This allowed for other information passing between the client and server, alongside the request and consequent page. • HTTP/1.1: Defined in RFC 2068 by the <i>IETF</i>, version 1.1 implemented a number of improvements over and above the 1.0 specification. One of the main improvements of 1.1 over 1.0 was the implementation of techniques such as persistent <i>TCP</i> connections, pipelining, and cache control to improve performance within <i>HTTP</i>-based applications. <p data-bbox="453 1174 1186 1206">https://www.informit.com/articles/article.aspx?p=169578</p>

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	<p>Upper and Lower layers further divide network architecture into seven different layers as below</p> <ul style="list-style-type: none"> • Application • Presentation • Session • Transport • Network, Data-link • Physical layers <div data-bbox="520 625 1656 1258"> <div style="border: 1px solid red; padding: 2px; display: inline-block; color: red;">HTTP resides at application layer</div> <p style="text-align: center;">Network Layers Diagram</p> <p>https://www.guru99.com/layers-of-osi-model.html</p> <p>https://www.cloudflare.com/learning/ddos/glossary/open-systems-interconnection-model-osi/</p> </div>

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